

Geochemical characteristics of the blueschists in northeastern China and their tectonic implications

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The blueschists in northeastern China (NE China) are generally distributed as layers or blocks in the *mélange*. The typical outcrops of the blueschists in NE China include the Toudaoqiao Blueschists in the central Great Xing'an Range and the Yilan as well as Mudanjiang Blueschists in the western Jiamusi Massif. The major and trace element concentrations of these blueschists were investigated to understand their petrogenesis, which provides important constraints on the collision and amalgamation processes of the microcontinents in NE China.

Geochemical characteristics show that the protoliths of the Toudaoqiao Blueschists are alkaline basalts ($\text{SiO}_2 = 40.24\% \sim 49.51\%$, $\text{K}_2\text{O} + \text{Na}_2\text{O} = 2.26 \sim 5.07\%$) which are relatively enriched in light rare earth and large ion lithophile elements, and weakly negative anomalies of high field strength elements (HFSE; e.g. Nb, Ta, P and Ti) but positive Sr anomalies. They are derived from partial melting of an enriched lithospheric mantle and contaminated by crustal components. The protoliths exhibit the affinities of oceanic island basalt (OIB). Combined with the previously studies, we proposed that the Toudaoqiao blueschist were formed during the continental collision.

Geochemical features show that the protolith of the Yilan and Mudanjiang Blueschists are mainly alkaline basalts ($\text{SiO}_2 = 35.50\% \sim 52.70\%$, $\text{K}_2\text{O} + \text{Na}_2\text{O} = 2.20\% \sim 8.56\%$) and some of them are subalkaline basalts, which are relatively enriched in large ion lithophile elements Rb, Ba and K, and show negative anomalies of high field strength elements Nb, Ta, Zr, Ti, and significant Sr and Gd negative anomalies but positive Pb anomalies. $\text{Hf/Ta} = 1.35 \sim 4.86$. It was concluded that they are derived from partial melting of enriched lithospheric mantle and mixed by ocean sediments. These blueschists have the property of OIB, and a minority of samples present mid-ocean ridge basalt (MORB) characteristics. Combined with previous studies and regional geological observations, we suggest that the Yilan and Mudanjiang Blueschist were formed during the oceanic crust subduction.